

Report for the year 2019 and future activities

SOLAS China

compiled by: Minhan Dai & Huiwang Gao

This report has two parts:

- **Part 1:** reporting of activities in the period of January 2019 - Jan/Feb 2020
- **Part 2:** reporting on planned activities for 2020 and 2021.

*The information provided will be used for reporting, fundraising, networking, strategic development and updating of the live web-based implementation plan. As much as possible, please indicate the specific SOLAS 2015-2025 Science Plan Themes addressed by each activity or **specify an overlap between Themes or Cross-Cutting Themes.***

- 1 Greenhouse gases and the oceans;
 - 2 Air-sea interfaces and fluxes of mass and energy;
 - 3 Atmospheric deposition and ocean biogeochemistry;
 - 4 Interconnections between aerosols, clouds, and marine ecosystems;
 - 5 Ocean biogeochemical control on atmospheric chemistry;
- Integrated studies of high sensitivity systems;
Environmental impacts of geoengineering;
Science and society.

IMPORTANT: *This report should reflect the efforts of the SOLAS community in the entire country you are representing (all universities, institutes, lab, units, groups, cities).*

First things first...Please tell us what the IPO may do to help you in your current and future SOLAS activities. ?

PART 1 - Activities from January 2019 to Jan/Feb 2020

1. Scientific highlight

Describe one scientific highlight with a title, text (max. 300 words), a figure with legend and full references. Please focus on a result that would not have happened without SOLAS, and we are most interested in results of international collaborations. (If you wish to include more than one highlight, feel free to do so).

Title: Partial pressure of CO₂ and air-sea CO₂ fluxes in the South China Sea: synthesis of an 18-year dataset

Text: Air-sea CO₂ fluxes in marginal seas serve as an important component of the ocean's carbon cycle. However, it remains challenging to reliably assess the carbon fluxes in individual coastal systems, which often feature large spatial and temporal variations. This study synthesizes spatial and temporal variations in surface seawater *p*CO₂ (partial pressure of CO₂) and associated air-sea CO₂ fluxes in the largest marginal sea of the North Pacific, the South China Sea (SCS), based on a large dataset collected from 47 surveys during 2000-2018. We found a large spatial variability in sea surface *p*CO₂ in the SCS, except during winter when values remained in a narrow range. In general, seasonal variability was evident in surface water *p*CO₂ values from the northern SCS, with lower values during the cold seasons and higher values during the warm seasons, except in the Pearl River plume and the area off northwest Luzon where winter upwelling occurred. In the SCS basin and the western SCS, *p*CO₂ in surface waters was generally higher than in the atmosphere. We also revealed large intra-seasonal variations in the northern SCS during monsoonal transitions in both spring and fall. In spring, *p*CO₂ increased with temperature in the northern SCS, which was a CO₂ sink in March but became a CO₂ source in May with April as a transitional month. Fall is also a transitional season for the northern SCS, where it changes from a CO₂ source back to a CO₂ sink. On an annual basis, the average CO₂ flux from the SCS was 1.2±1.7 mmol m⁻² d⁻¹. Enhanced carbon sink on the northern SCS shelf was observed in winter. The annual average CO₂ flux was significantly lower than the previous estimate, which can largely be attributed to the addition of new datasets in the previously under-sampled seasons and regions.

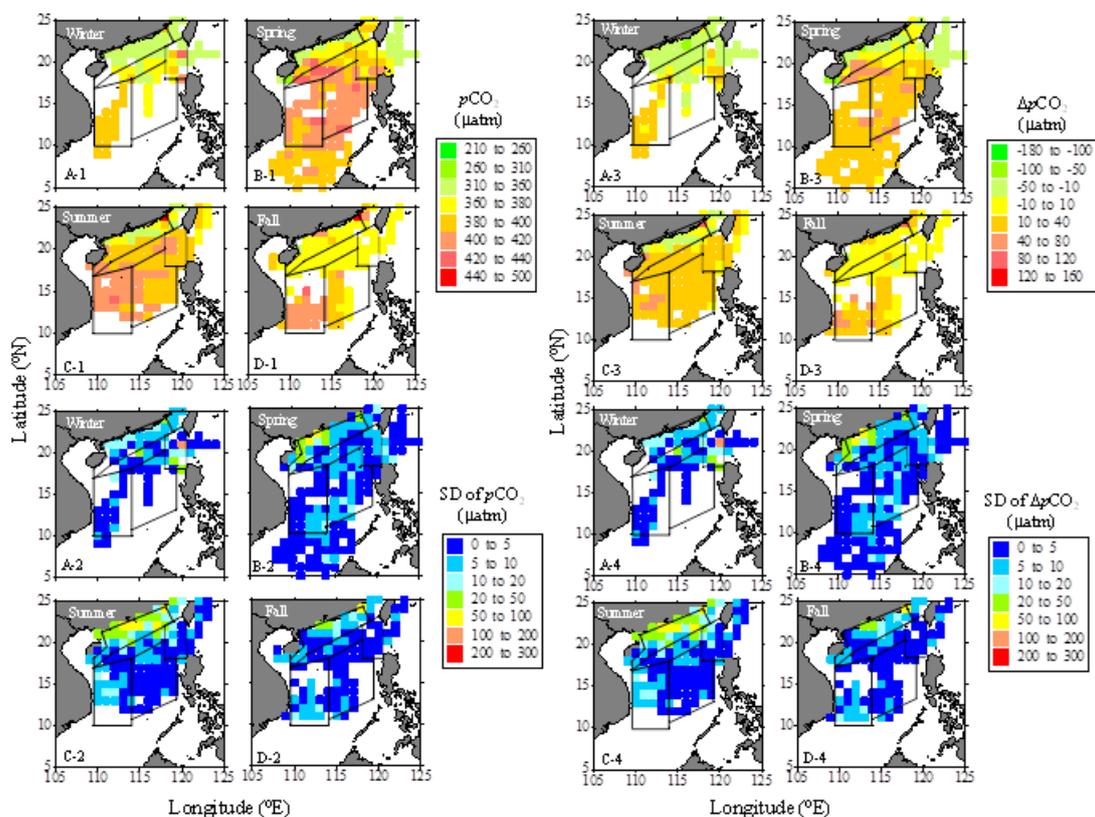


Figure: Distribution of seasonal averages and standard deviations (SD) of *p*CO₂ and Δ*p*CO₂ in 1°×1° grids in the South China Sea. The *p*CO₂ values were normalized to the year 2010.

Citation: Li, Q., X.H. Guo, W.D. Zhai, Y. Xu, and M.H. Dai, 2020. Partial pressure of CO₂ and air-sea CO₂ fluxes in the South China Sea: synthesis of an 18-year dataset. Progress in Oceanography, 182, 102272, doi.org/10.1016/j.pocean.2020.102272.

Title: Fertilization of the Northwest Pacific Ocean by East Asia air pollutants

Text: Haze particles as a key air pollutant contain high level of toxins, which were hypothesized to inhibit phytoplankton growth when deposited to the ocean, and thus indirectly affect the climate. However, field observations have yet to provide conclusive evidence to confirm this hypothesis. Onboard microcosm experiments in the Northwest Pacific Ocean (NWPO) show that haze particles collected at the East Asia continent had an inhibition impact on phytoplankton growth only when at very high particle loading (2 mg L⁻¹). In contrast, haze particles at low and medium loadings (0.03–

0.6 mg L⁻¹) stimulated phytoplankton growth and shifted phytoplankton size structure toward larger cells, primarily due to the supply of inorganic nitrogen nutrients from the particles. Model simulations showed that haze particle loading in NWPO surface seawater was usually more than an order of magnitude lower than 2 mg L⁻¹. This indicates that haze particles are unlikely to cause harm but to stimulate phytoplankton growth in the nitrogen-limited NWPO. Ocean biogeochemical modeling further shows that deposited nitrogen significantly enhanced surface ocean chlorophyll a concentration in the winter and spring of 2014. Overall, these results demonstrate that haze particles stimulate rather than inhibit primary production in the NWPO.

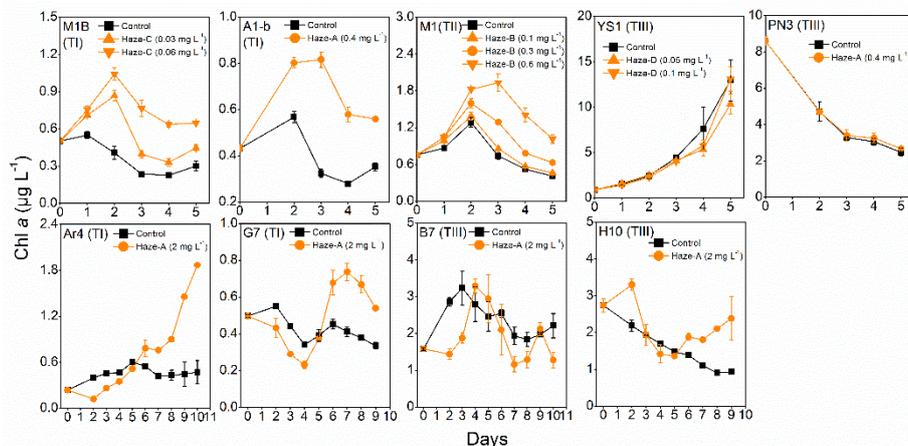


Figure: Responses of total Chl a to haze particle additions at different stations. At stations M1, M1B, and A1 - b, addition of haze particles led to an increase in Chl a and enhancement increases with increasing haze particle loading (up to 0.6 mg L⁻¹) in comparison to controls. YS1 and PN3 showed no response to haze particle additions while higher particle loading (2 mg L⁻¹) caused a decrease in Chl a at all studied stations (Ar4, G7, B7, and H10) in comparison to controls, suggesting a toxicity effect.

Citation: Zhang, C., A. Ito, Z. B. Shi, M. N. Aita, X. H. Yao, Q. Chu, J. H. Shi, X. Gong, and H.W. Gao, 2019. Fertilization of the Northwest Pacific Ocean by East Asia air pollutants. *Global Biogeochemical Cycles*, 33, doi.org/10.1029/2018GB006146.

Title: New particle formation in the marine atmosphere during seven cruise campaigns

Text: We measured the particle number concentration, size distribution, and new particle formation (NPF) events in the marine atmosphere during six cruise campaigns over the marginal seas of China in 2011–2016 and one campaign from the marginal seas to the Northwest Pacific Ocean (NWPO) in 2014. We observed relatively frequent NPF events in the atmosphere over the marginal seas of China, i.e., on 23 out of 126 observational days, with the highest frequency of occurrence in fall, followed by spring and summer. In total, 22 out of 23 NPF events were found to be associated with the long-range transport of continental pollutants based on 24 h air mass back trajectories and pre-existing particle number concentrations, which largely exceeded the clean marine background, leaving one much weaker NPF event that was likely induced by oceanic precursors alone, as supported by multiple independent pieces of evidence. Although the long-range transport signal of continental pollutants can be clearly observed in the remote marine atmosphere over the NWPO, NPF events were observed on only 2 out of 36 days. The nucleation-mode particles (<30 nm), however, accounted for as high as 35 %±13 % of the total particle number concentration during the NWPO cruise campaign, implying the existence of many undetected NPF events in the near-sea-level atmosphere or above.

To better characterize NPF events, we introduce a term called the net maximum increase in the nucleation-mode particle number concentration (NMINP) and correlate it with the formation rate of new particles (FR). We find a moderately good linear correlation between NMINP and FR at FR ≤ 8 cm⁻³ s⁻¹, but no correlation exists at FR > 8 cm⁻³ s⁻¹. The possible mechanisms are argued in terms of the roles of different vapor precursors. We also find that a ceiling exists for the growth of new particles from 10 nm to larger sizes in most NPF events. We thereby introduce a term called the maximum geometric median diameter of new particles (D_{pgmax}) and correlate it with the growth rate of new particles (GR). A moderately good linear correlation is also obtained between the D_{pgmax} and GR, and only GR values larger than 7.9 nm h⁻¹ can lead to new particles growing with a D_{pgmax} beyond 50 nm based on the equation. By combining simultaneous measurements of the particle number size distributions and cloud condensation nuclei (CCN) at different super saturations (SS), we observed

a clear increase in CCN when the D_{pg} of new particles exceeded 50 nm at SS=0.4 %. However, this case did not occur for SS=0.2 %. Consistent with the results of previous studies in the continental atmosphere, our results imply that particles smaller than 50 nm are unlikely activated as CCN at SS=0.4 % in the marine atmosphere. Moreover, κ decrease from 0.4 to 0.1 during the growth period of new particles, implying that organics likely overwhelm the growth of new particles to CCN size. The chemical analysis of nano-Micro-Orifice Uniform Deposit Impactor (nano-MOUDI) samples reveals that trimethylamine (TMA) and oxalic acid might appreciably contribute to the growth of new particles in some cases.

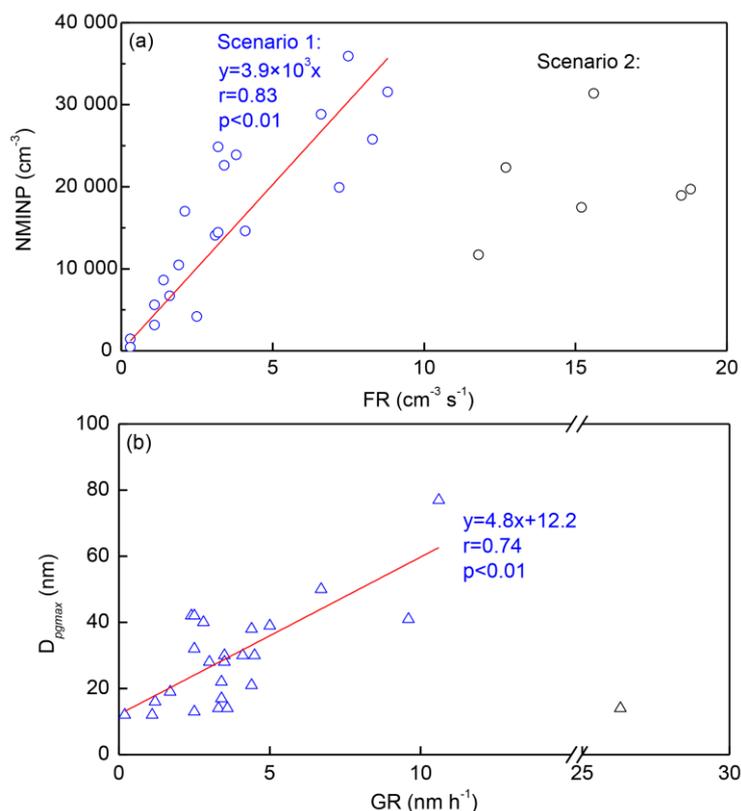
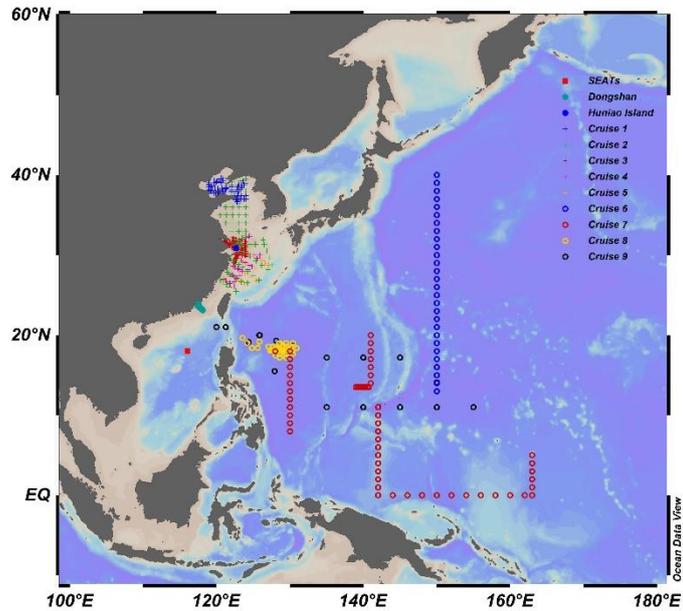


Figure: Relationship between the new particle formation rate (FR) and net maximum increase in the nucleation-mode particle number concentration (NMINP), growth rate (GR), and maximum geometric median diameter of new particles (D_{pgmax}) in NPF events over the marginal seas of China and NWPO (the black shapes were treated as outliers, i.e., greater than 3 standard deviations from the regression curve, and were excluded from the correlation analysis).

Citation: Zhu, Y., K. Li, Y. Shen, Y. Gao, X. Liu, Y. Yu, H. Gao, and X. Yao, 2019. New particle formation in the marine atmosphere during seven cruise campaigns, *Atmospheric Chemistry and Physics*, 19, 89–113, doi.org/10.5194/acp-19-89-2019.

2. Activities/main accomplishments in 2019 (e.g., projects; field campaigns; workshops and conferences; model and data intercomparisons; capacity building; international collaborations; contributions to int. assessments such as IPCC; collaborations with social sciences, humanities, medicine, economics and/or arts; interactions with policy makers, companies, and/or journalists and media).

■ **Cruises and field experiments**



1) Time-Series

Time	Location	Parameters investigated	Theme
9-22 Jul., 2019	South East Asia Time-series Study station (SEATS) in South China Sea	Investigated how monsoonal forcing controls biogeochemical cycles in the SCS	1
Apr., Aug., Oct., and Dec., 2019	Huaniao Island	Parameters investigated include chemical composition, optical properties and size distribution of aerosols, persistent organic pollutants (POPs), airborne microorganisms	3, 4
Jun. and Nov. 2019	Dongshan Bay	Parameters related to the air-sea CO ₂ fluxes and carbonate system were collected	1

2) Cruises

ID	Time	Location	Activities	Theme
1	10-19 Dec., 2019	Yellow Sea	Parameters investigated include chemical composition and size distribution of aerosols, particle number concentrations and CCN, spatial variations and sea-air fluxes of biogenic active gas (DMS, CH ₄ , N ₂ O, volatile halohydrocarbons, non-methane hydrocarbons)	2-5
2	26 Dec., 2019- 18 Jan., 2020	EastChina Sea and Yellow Sea	Parameters investigated include chemical composition and size distribution of aerosols, biogenic active gases (dimethyl sulfide, amines, NH ₃ , etc.), POPs, airborne microorganisms, mercury, phytoplankton community structure. The biogeochemical cycle and climate effects of DMS, CH ₄ and N ₂ O were studied	1, 3, 4
3	Winter, summer, fall in 2019	Yangtze River Estuary	Spatial variations and sea-air fluxes of biogenic active gas (DMS, CH ₄ , N ₂ O, volatile halohydrocarbons, non-methane hydrocarbons) were investigated. During the cruises, deck incubation experiments were carried out to assess the effects of nutrients, iron, dust additions and ocean acidification on phytoplankton growth and production of DMS,	2
4	Spring in 2019	EastChina Sea		
5	Fall in 2019	EastChina Sea		
6	Fall in 2019	Northwest Pacific		

7	Oct., 2019-Jan., 2020	Northwest Pacific	dimethylsulfoniopropionate (DMSP) and dimethyl sulfoxide (DMSO)	
8	15 Mar.- 20 Apr., 2019	The prominent cyclonic eddies in the Northwest Pacific Ocean off Taiwan	Investigated the submesoscale variability and the temporal evolution of the biogeochemistry especially the export productivity within the mesoscale cyclonic eddies. Parameters related to the air-sea CO ₂ fluxes and carbonate system were collected	1
9	26 Apr.- 10 Jun., 2019	Western North Pacific along the GP09 Section	The first GEOTRACES-China cruise investigated 16 stations with multi-disciplinary, platform, and instrumental observations, including LADCP, MVP, normal and trace metal clean CTD rosettes, in situ pumps, large volume incubation experiments, plankton trawling, and aerosol sampling.	1

■ Selected Projects

- National Key Research and Development Program of China: The Migration and Transformation of Marine Biogenic Active Gases in the Atmosphere and Their Climate Effects (2016-2021), Leading PI: Ying Chen at Fudan University. (Theme 3 & 4)
- NSFC General Program: Variation of Abundance and Community Structure of Airborne Microorganisms and Affecting Mechanism over the East China Sea (2018-2022), Leading PI: Ying Chen at Fudan University. (Theme 3 & 4)
- National Key Research and Development Program of China: Vertical Observation of Aerosol Particles and their Characteristics at Single Particle Level within Marine Boundary Layer at Coastal Areas (2018-2021), leading PI: Bingbing Wang at Xiamen University. (Theme 4)
- NSFC Innovative Research Group: Nitrogen Cycle under Global Change (2018-2023), Leading PI: Shuh-Ji Kao at Xiamen University. (Theme 1)
- NSFC Youth Program: Utilizing Ultrahigh Resolution Mass Spectrometry and Molecular Markers to Characterize the Molecular Composition and Fate of Atmospheric Dissolved Organic Carbon in the South China Sea (2018-2020), Leading PI: Hongyan Bao at Xiamen University. (Theme 3)
- NSFC General Program: Effects of Multiphase Reactions for Atmospheric Organic Acid on Deposition Ice Nucleation Efficiency of Particles (2018-2021), leading PI: Bingbing Wang at Xiamen University. (Theme 3)
- CHOICE-C (Carbon Cycling in China Seas-Budget, Controls and Ocean Acidification) project was renewed by the MOST of China for another 5 years from January 2015 to December 2019. This renewed project is termed as CHOICE-C II with a budget of 25 million CNY. Through comparative study of carbon cycling in River-dominated-Ocean-margins (RioMars, the northern South China Sea shelf being a case) and the Ocean-dominated-Ocean-margins (OceMars, the South China Sea basin being a case), CHOICE-C II is focusing on the carbon cycle in South China Sea in terms of its budget, controls and global implications. (Theme 1 & 2)
- National Key Research and Development Program: Biogeochemical Processes and Climate Effect of Marine Biogenic Trace Gases in the East Marginal Seas of China (2016-2021). Leading PI: Guipeng Yang at Ocean University of China. (Theme 1)
- NSFC Major Program: CARBON Fixation and Export in the oligotrophic ocean (Carbon-FE) (2019-2023), Leading PI: Minhan Dai at Xiamen University. (Theme 1 & 2 & 3 & Environmental impacts of geoengineering)
- NSFC General Program: Characteristics of Atmospheric Deposition Dominated by Haze Weather and Its Effect on Phytoplankton Growth in the Bohai and Yellow Sea (2019-2022), Leading PI: Huiwang Gao at Ocean University of China. (Theme 3)

■ Infrastructure

- New deep-sea research vessel (Dong-Fang-Hong 3) with the capacity of SOLAS researches

has been delivered to Ocean University of China (OUC) in May 2019.

- Xiamen University launched Dongshan Swire Marine Station (D-SMART) which locates in Dongshan Island, 140 km from Xiamen. D-SMART is now open for multidisciplinary observation, research, and education. Closely related to SOLAS research, D-SMART is designed to provide and host in situ ocean observation and to establish a multidisciplinary observation network for the atmospheric science, physical oceanography, biogeochemistry and marine biology, and to monitor and understand responses of the marine ecosystem to both climate change and anthropogenic activities. D-SMART is running time-series cruises for surrounding coastal sea and upwelling system.

■ International interactions and collaborations

1) Conference presentations

- Ying Chen, Atmospheric deposition of nitrogen and trace metals affects marine phytoplankton and their feedback to aerosols, SOLAS Open Science Conference, 21-25 Apr. 2019, Sapporo, Japan (Plenary talk).
- Minhan Dai, Air-sea CO₂ fluxes, diapycnal nutrient fluxes and export productivity in oligotrophic ocean, SOLAS Open Science Conference, 21-25 Apr. 2019, Sapporo, Japan (Plenary talk).
- Huiwang Gao, Changes in phytoplankton community due to dust addition in eutrophication, LNLC and HNLC seawaters in the Northwest Pacific, SOLAS Open Science Conference, 21-25 Apr. 2019, Sapporo, Japan (Poster)
- Xiaohong Yao, Mapping concentrations of ammonia in the marine atmosphere along the long coastline in China, SOLAS Open Science Conference, 21-25 Apr. 2019, Sapporo, Japan (Poster)
- Jianhua Qi, Distribution of dry deposition velocities and fluxes of atmospheric particulate nitrogen and phosphorus over the China Marginal Seas and Northwest Pacific, SOLAS Open Science Conference, 21-25 Apr. 2019, Sapporo, Japan (Poster)
- Xiaohong Yao, Formation of particulate matters in thin air, 6th Asian Aerosol conference, 20-24 May 2019, Hong Kong (Invited talk)

2) Conference & meetings organized

- The 4th Global Ocean Acidification Observing Network (GOA-ON) International Workshop held at Hangzhou, 14-17 Apr., 2019.
- From 6 to 9 Jan. 2019, the 4th Xiamen Symposium on Marine Environmental Sciences (XMAS-IV) with the theme of 'The Changing Ocean Environment: From a Multidisciplinary Perspective' took place in Xiamen, China. The symposium consists of 33 sessions covering physical oceanography, marine biogeochemistry, biological oceanography, and marine ecotoxicology along with workshops for emerging topics in marine environmental sciences. A SOLAS Session C4 entitled "Surface Ocean and Lower Atmosphere Study—Air-sea interactions and their climatic and environmental impacts" was included. In this session, the SOLAS scientific community exchanged new ideas and discussed the latest achievements in our understanding of the key biogeochemical-physical interactions and feedbacks between the ocean and the atmosphere, and of how this coupled system affects and is affected by climate and environmental change. Studies focusing on atmosphere-ocean exchange of climate active gases, atmospheric deposition, chemical transformations of gases and particles, interactions between anthropogenic pollution with marine emissions, feedbacks from ocean ecosystems and impacts to environments and climate were presented in particular.
- Minhan Dai was one of the four Program Committee Co-chairs of OceanObs'19 which was held in Honolulu, Hawaii from 16 to 20 Sep., 2019. This is the first time for Chinese ocean observing community to be fully involved in the OceanObs conference series.

3) Contribution to international initiatives

- Minhan Dai is engaged in REgional Carbon Cycle Assessment and Processes-2 (RECCAP2) which is an activity of the Global Carbon Project with a number of partners. The objectives of RECCAP2 are: 1) to quantify anthropogenic greenhouse gas emissions, 2) to develop robust observation-based estimates of changes in carbon storage and greenhouse gas emissions and sinks by the oceans and terrestrial ecosystems, distinguishing whenever possible anthropogenic

vs. natural fluxes and their driving processes, 3) to gain science-based evidence of the response of marine and terrestrial regional GHG (CO₂, CH₄, N₂O) budgets to climate change and direct anthropogenic drivers. To address these objectives, RECCAP2 will design and perform a set of global syntheses and regional GHG budgets of all lands and oceans, and explore mechanisms by which to deliver regular updates of these regional assessments based on scientific evidence, considering uncertainties, understanding of drivers, and retrospective analysis of recent trends. RECCAP2 is expected to accomplish most of the work over 2019-2020 with publication of all papers by 2021.

- Minhan Dai and Nianzhi Jiao were invited to participate the International Workshop on Integrated Ocean Carbon Research, held at IOC-UNESCO headquarters in Paris (France) on 28–30 Oct., 2019. The Workshop was co-convened by the Intergovernmental Oceanographic Commission of UNESCO (IOC), the International Ocean Carbon Coordinating Project (IOCCP), the Surface Ocean-Lower Atmosphere Study (SOLAS), the Integrated Marine Biosphere Research Project (IMBeR), the Climate and Ocean Variability, Predictability and Change core project of the World Climate Research Programme (CLIVAR), and the Global Carbon Project (GCP).

■ **Human dimensions (outreach, capacity building, public engagement etc.)**

- The 7th Xiamen University Ocean Sciences Open House was held on 4 Nov., 2019, Zhou-Long-Quan Building, Xiang'An Campus, Xiamen University, China.
- Launched on 1 Nov., 2019, the 70.8 Media Lab was jointly established by the Xiamen University Faculty of Earth Science and Technology and Sina Xiamen. The Media Lab will fully integrate social media and the global forces marine research to promote the development of channels between the public and marine science, and enhance the marine awareness of citizens.

3. Top 5 publications in 2019 (only PUBLISHED articles) and if any, weblinks to models, datasets, products, etc.

- (1). Cao, Z., W. Yang, Y. Zhao, X. Guo, Z. Yin, C. Du, H. Zhao, and M. Dai, 2019. Diagnosis of CO₂ dynamics and fluxes in global coastal oceans. *National Science Review*, doi.org/10.1093/nsr/nwz105.
- (2). Zhang, G.L., S.M. Liu, K.L. Casciotti, M.S. Forbes, X.J. Gu, Y.Y. Ren, and W.J. Zheng, 2019. Distribution of concentration and stable isotopic composition of N₂O in the shelf and slope of the northern South China Sea: Implications for production and emission. *Journal of Geophysical Research: Oceans*, 124. doi.org/10.1029/2019JC014947.
- (3). Li, C.X., B.D. Wang, Z.C. Wang, J. Li, G.P. Yang, J.F. Chen, L.N. Lin, Y.Lyu, and F. Guo, 2019. Spatial and interannual variability in distributions and cycling of summer biogenic sulfur in the Bering Sea. *Geophysical Research Letters*, 46, 4816-4825.
- (4). Zhang, C., X.H. Yao, Y. Chen, Q. Chu, Y. Yu, J.H. Shi and H.W. Gao, 2019. Variations in the phytoplankton community due to dust additions in eutrophication, LNLC and HNLC oceanic zones. *Science of the Total Environment*, 669, 282–293.
- (5). Shi, J.H., N. Wang, H.W. Gao, A. Baker, X.H. Yao and D.Z. Zhang, 2019. Phosphorus solubility in aerosol particles related to particle sources and atmospheric acidification in Asian continental outflow. *Atmospheric Chemistry and Physics*, 19, 847-860.

4. Did you engage any stakeholders/societal partners/external research users in order to co-produce knowledge in 2019? If yes, who? How did you engage?

- A mini-workshop to improve industry-science responses to multi-stressor impacts on aquaculture was convened by Weiwei You and Guihua Wang on the 4th GOA-ON International Workshop. This special event engaged aquaculture stakeholders directly in dialogue with scientists to bridge knowledge gap between science research and industrial practice. Through discussion, it aimed to identify ways to bridge these sectors in order to deliver scientific solutions that can sustain thriving coastal aquaculture, communities, and economies.
- Xiamen University Faculty of Earth Science and Technology collaborated with Sina Xiamen to establish the 70.8 Media Lab. The Media Lab will fully integrate social media and the global forces marine research to promote the development of channels between the public and marine science, and enhance the marine awareness of citizens.
- Engaged expert from Development Research Centre of the State Council to co-design a new initiative on coastal sustainability as a NSFC Major Program.

PART 2 - Planned activities for 2019/2020 and 2021

1. Planned major national and international field studies and collaborative laboratory and modelling studies (incl. all information possible, dates, locations, teams, work, etc.).

- There will be a summer cruise (from 20 May - 4 Jul., 2020) and a winter cruise (from the end of 2020 to Jan. 2021) to the Northwest Pacific conducted by R/V TAN KAH KEE, which aim to examine carbon fixation and export, or the biological pump in general, regulated by differently sourced nutrients including macronutrients (i.e., N, P, Si) and micronutrients (e.g., Fe).
- Summer cruise of project "CCN associated with fresh and aged marine-traffic aerosols under high atmospheric NH₃ background in the Yangzi River Estuary" is planned in 2020.
- Fall cruise of project "Biogeochemical processes and climate effects of biogenic active gases in the eastern continental shelf of China" is planned in 2020.
- Summer cruise for investigating the biogeochemistry of marine biogenic gases in the northwest Pacific Ocean is planned in 2020.
- Cruises for the investigation of seasonal variations of DMS, CH₄, N₂O, volatile halocarbons, non-methane hydrocarbons and methanol in the Yangtze River Estuary are planned in 2020.

2. Events like conferences, workshops, meetings, summer schools, capacity building etc. (incl. all information possible).

- PICES-2020: Session S5, Atmospheric nutrient deposition and microbial community responses, and predictions for the future in the North Pacific Ocean, 22 Oct.-1 Nov., 2020, Qingdao, Cosponsored by SOLAS, Convened by J Jun Nishioka, Guiling Zhang, Huiwang Gao, etc.
- C1 biogeochemistry workshop will be held at Ocean University of China, Nov., 2020, Qingdao
- International meeting on marine biogenic gases will be held at Ocean University of China, Sep., 2020, Qingdao
- International Scoping Workshop towards Integrated Research and Sustainability of the Coastal Ocean (Coastal-SOS) will be held in Xiamen, Sep. 2020. This workshop will gather an interdisciplinary community of scientists from geoscience, social economy, policy management, environmental ecology, model simulation, and other related fields for in-depth discussion on bold questions and solutions related to the coastal ocean. It will also promote opportunities where international collaboration can provide unique advantages of scope, scale, expertise, and facilities that enable advancement of scientific understanding of key coastal ocean issues towards sustainability.

3. Funded national and international projects/activities underway.

- NSFC program: CARBON Fixation and Export in the oligotrophic ocean (Carbon-FE) (2019-2023), Leading PI: Minhan Dai at Xiamen University.
- NSFC Key Project: Source and sink of volatile halogenated organic compounds in the East China Sea and the Yellow Sea and their influences on the environment (2019-2023), PI: Guipeng Yang at Ocean University of China.
- NSFC General Program: Characteristics of atmospheric deposition dominated by haze weather and its effect on phytoplankton growth in the Bohai and Yellow Sea (2019-2022), Leading PI: Huiwang Gao at Ocean University of China.
- NSFC General Project: Study on the source, distribution, transformation and removal of COS and CS₂ in the continental shelf seas of eastern China (2020-2024), PI: Guipeng Yang from Ocean University of China.
- NSFC-Shandong Joint Fund program: Impacts of atmospheric deposition on water quality and ecosystem in the coastal waters of Shandong Province (2020-2023), Leading PI: Huiwang Gao at Ocean University of China.
- NSFC General Program: Influences of hydrodynamics on the spatial distribution and long-term variations of Persistent Halogenated Hydrocarbons in the Bohai, Yellow, and East China Seas (2020-2023), Leading PI: Xinyu Guo at Ocean University of China.

4. Plans / ideas for future national or international projects, programmes, proposals, etc. (please indicate the funding agencies and potential submission dates).

- Project on C1 (e.g., DMS, methanol, methylamine) biogeochemistry in China marginal seas is to be submitted to NSFC in Apr. 2020.
- The proposal of integrated research on sustainability of the coastal ocean is to be submitted to NSFC for Major Project in Sep./Oct. 2020. The prospective proposal aims to address how land-sea-ocean-atmosphere/ecosystem-resource-environment-social economic system is coupled in the coastal ocean under dual stresses of climate change and human activities.

5. Engagements with other international projects, organisations, programmes, etc.

- Minhan Dai is a member of the Expert Group of the High Level Panel for a Sustainable Ocean Economy (HLP). HLP is a unique initiative of 14 serving heads of government committed to catalysing bold, pragmatic solutions for ocean health and wealth that support the UN Sustainable Development Goals and build a better future for people and the planet. The HLP has commissioned a series of 'Blue Papers' to explore pressing challenges at the nexus of the ocean and the economy. Lead by Jan-Gunnar Winther and Minhan Dai, Blue Paper #14 on Integrated Ocean Management, is part of a series of 16 papers that are being published between November 2019 and June 2020. This paper makes the case for integrated ecosystem-based management, which combines value creation and the safeguarding of ecosystem health.
- Minhan Dai and Nianzhi Jiao were invited to participate the International Workshop on Integrated Ocean Carbon Research, held at IOC-UNESCO headquarters in Paris (France) on October 28–30, 2019. The goal of this workshop was to bring together the decades of collective experiences of the above mentioned expert groups to inform the next generation of integrated ocean carbon research. Specifically, by discussing the themes on biological and geochemical aspects, temporal and spatial scales, methodologies and models, and societal applications of ocean carbon research, the workshop aimed to identify the research needed to fill critical knowledge gaps, better integrate our science so as to address the growing policy needs for information on how global change impacts on the carbon cycle and how, in turn, changes in the carbon cycle impact on our planet – with a focus on the ocean component.
- Minhan Dai is engaged in REgional Carbon Cycle Assessment and Processes-2 (RECCAP2) which is an activity of the Global Carbon Project with a number of partners. The objectives of RECCAP2 are: 1) to quantify anthropogenic greenhouse gas emissions, 2) to develop robust observation-based estimates of changes in carbon storage and greenhouse gas emissions and sinks by the oceans and terrestrial ecosystems, distinguishing whenever possible anthropogenic vs. natural fluxes and their driving processes, 3) to gain science-based evidence of the response of marine and terrestrial regional GHG (CO₂, CH₄, N₂O) budgets to climate change and direct anthropogenic drivers. To address these objectives, RECCAP2 will design and perform a set of global syntheses and regional GHG budgets of all lands and oceans, and explore mechanisms by which to deliver regular updates of these regional assessments based on scientific evidence, considering uncertainties, understanding of drivers, and retrospective analysis of recent trends. RECCAP2 is expected to accomplish most of the work over 2019-2020 with publication of all papers by 2021.

Comments